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Ever Guardian - Support Care App for Elderly People



Abstract: - The day-to-day struggles of the elderly with their healthcare needs, and dealing with emergencies. The existing care support systems are not very user-friendly and it can be tiresome for the elderly to have different features on different applications. To confront these challenges and to improve the well-being and quality of life of the elderly, we propose the development of a user-friendly support care app for our beloved elderly. One of the important features of this application includes medical reminders which allow users to set up important reminders with a custom message and stay on track with their medical courses. In addition to this, the application will include a built-in BMI calculator, providing a quick way to monitor their health changes over time. The integration of GPS for real-time location tracking helps guardian get peace of mind knowing they can track every moment of their elderly and be alert to it. The app will feature an SOS button that immediately informs the guardian about the elderly being in danger, providing immediate assistance during emergencies. This app tries to offer betterment of elderly health care and provide a support system for us.

Keywords: Cross-Platform Application, Guardian, User, Location, Elderly, Feature, BMI Calculator, Emergency, Medical, Detection

I. INTRODUCTION

In the advancing era of technology, senior citizens find it difficult to be in flow with the technology. As our grandparents grow older, ensuring their well-being and safety becomes very difficult. In response to these challenges, as addressed, we present a mobile app, an innovative app named, Ever-Guardian. This app acts as a support system that provides a wide range of specialized features which are designed to meet the distinct needs which are faced by the senior citizen and their relatives which enhances their sense of empowerment. EverGuardian manages medication schedules in a very simple way. Both users of the app, the elderly and guardian can set customized medications and other important reminders and by that, they will receive an alarm upon the selected time. For us, safety and security are our top priorities, especially when our grandparents wander out alone. Hence, to address this issue, EverGuardian offers a real-time location tracking feature. In this screen, the elderly can see their current location whereas, the guardian can track the location of the elderly when both the users are connected. This location is depicted in the form of Google Maps which shows a detailed map of the location of the elderly person. EverGuardian also features an SOS screen. This screen allows the elderly to alert their guardian when they are in some danger. With a predefined message in times of emergency for the elderly, the helper will receive an alert. Another service that the app offers is a BMI Calculator. This calculator is used to ensure that the elderly keep track of their fitness according to their body and they can plan their fitness plan according to the received BMI. By facilitating smooth communication, providing safety protocols, and advocating for health maintenance, this app enhances the well-being of both users. EverGuardian stands as a power of technology that makes a large difference in the lives of all senior citizens. Together, let us embark on this expedition of dignity, safety, and vitality.

II. LITERATURE SURVEY

In the implementation of our project, we conducted a deep review of relevant research papers on similar applications. This guided us to learn about the features, challenges, and innovations in existing solutions which gave a great approach to our project. Below are the research papers we reviewed:

SuperCarly, a comprehensive smart life assistant aims to revolutionize the way users manage their activities. It integrates features such as location tracking, messaging, and media organization; it enhances the traditional calendar experience. Its ability to analyze daily life patterns is its key innovation. It provides personalized suggestions for the betterment and well-being of each individual. This feature contributes to the fascinating repository of statistical life patterns, which offers valuable insights into human behavior and trends. The paper effectively communicates the app's features, purpose, and benefits [1]. Location-Based Parental Control Child

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Tracking App Using Mobile Operating System presents a mobile application to address the concern for child safety, especially in tracking the location of the child using mobile technology. Using location-based services, the application enables parents to monitor their children's time-to-time movement. The most important contribution of the paper is its practical approach to addressing safety concerns through technology by integrating real-life location-tracking and geo-fencing. The paper also provides the future scope which may help people reading the paper with betterment of the application [2].

Bookazor is a digital planner that books appointments for you with different businesses such as saloons, hospitals, etc. It uses Firebase, which fetches data for booking appointments. It checks if a specific time slot is open, assigns the job to the right people, and updates the schedule regularly. It is easy to book appointments while using modern technology [5].

III. TECHNOLOGIES USED

To develop this innovative app we have used some technologies and emulators. The user interface of the application was built on *Figma*. To develop the functionality of the app, *React Native Expo* was used. To put proper styling to the app and make it more user-friendly, *NativeWind* was used. To handle all operations of the link and to create a proper database, *Firebase* was used. For the testing of the app, the Expo Go app was used. Lastly, the app was deployed on the Expo Store and is available as a cross-platform app that works on Android and iOS.

IV. PREPARE YOUR PAPER BEFORE STYLING

EverGuardian is an innovative app designed to tackle the difficulties faced by aging people and their guardians. This app provides a strong platform for communication, safety measures, and health management, therefore bringing more ease into the lives of the elderly and their caregivers.

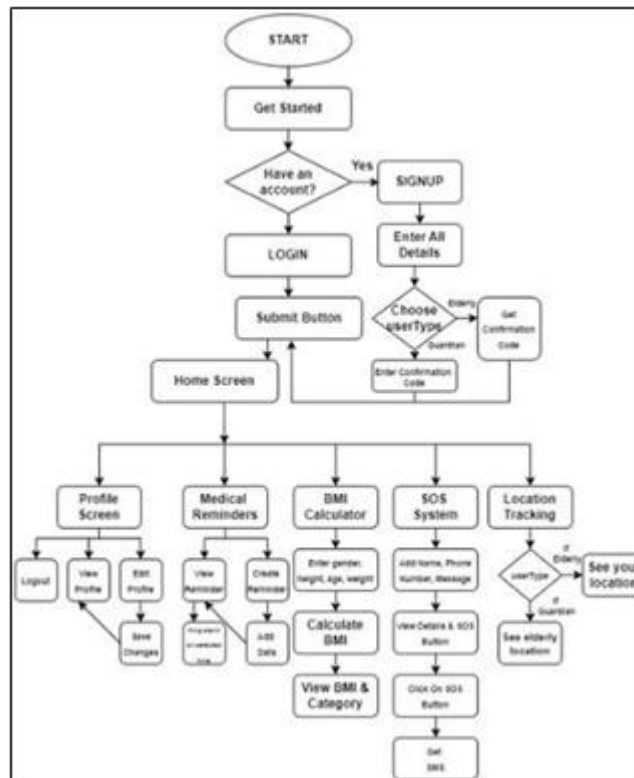


Fig 1. System Architecture

V. IMPLEMENTATION AND RESULTS

This section focuses on elevating the application's design and functionalities to the real world. Here, we hunt through the detailed development of each screen, the core functionalities, and the various libraries and packages integrated. Each component was implemented in regard to the technologies proposed, the system architecture, and ensuring cross-platform compatibility.

A. Login And Signup Screen

The login screen (as shown in Figure 3), created using *React Native* is used to authenticate users based on their authentication details provided earlier to navigate them to their personalized profiles of the system. The system uses many elements such as text, buttons, and text input to create a user-friendly UI for the elderly and their respective guardians. The page begins with a ‘welcome’ message for the users. (as shown in Figure 2) The page contains two fields to authenticate users, Email and Password. There are two buttons, Signup and Login where the Signup button redirects the users to the signup page where new users can register themselves. The login button redirects the users to the home page if their login credentials entered are right. The Login function sends the data to *Firebase* to confirm the details of users and to authenticate them, on failed authentication the users are redirected to the login page with an error message. The Signup screen (as shown in Figure 4) is used to facilitate user registration in the mobile application. It uses *React Native* components similar to the Login screen to create a user-friendly interface. The details asked for are ‘First Name’, ‘Last Name’, ‘Phone no.’, ‘Email’, ‘Password’, and ‘User type’. The user type allows users to choose between two types, elderly or guardian. This helps the app to differentiate between the types of users and to connect each elderly to their guardians. Guardians are given one more field of confirmation code to enter which appears on the elderly’s screen to connect both the users. Once the users click on the Signup button their credentials are sent to the *Firebase* and stored for future login purposes.



Fig 2. Welcome Screen

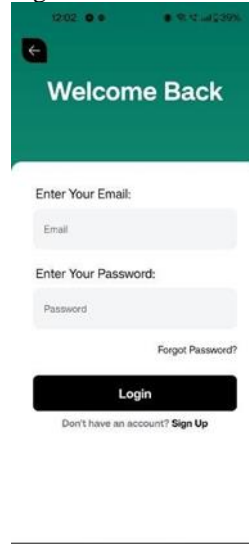


Fig 3. Login Screen

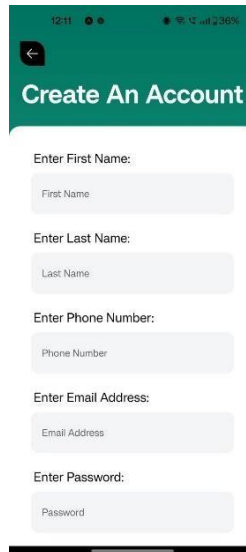


Fig 4. Signup Screen

B. Connection Between Users

Here there are two types of users which are elderly and guardians. The elderly are represented as a user over the age of 65 or any age who needs medical assistance and is prone to emergencies. Whereas, the guardian can use the account of the elderly and make sure that the elderly are safe where they are and keep track of their medical records.

The user interface is created as simple as possible for the elderly to use it in a convenient way to the extent that they just have to confirm whether they are the elderly and a six-digit connection code will be displayed on the screen. This connection code gets stored along with the userID of the elderly in the user's database. Once the guardian enters the confirmation code given by the elderly in the signup screen, the user gets connected and the guardian can access the elderly's account. This connection between the two users is not just one-to-one but is one-to-many as one guardian can have multiple elderly users connected with them. In the implementation, the guardian users are given the privilege to create reminders or alarms and locate the elderly user. The rules of the guardian users have been set and they can set or create or delete reminders and alarms which will be displayed on the screen. The elderly user can dismiss the alarm or reminder once run and can set reminders or alarms for themselves. Some rules have also been set for the guardian users to locate the elderly user (as shown in Figure 5).

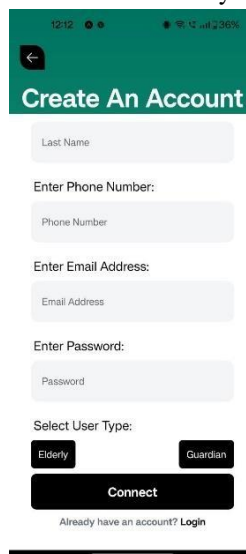


Fig 5. Connection Between Users

C. Figures and Tables

The profile page allows users to view or update their profile saved in the application. It fetches data from the

Firebase which was posted during the signup. It displays the name, email, phone number, and confirmation code which was used for the connection of the elderly and their guardians. Along with displaying the user's profile details, it also gives an edit profile functionality where the user can edit their details and upon editing the details, it will be updated on the screen as well as on the database. It also incorporates a logout button which upon clicking navigates the users back to the Welcome screen (as shown in Figure 6).

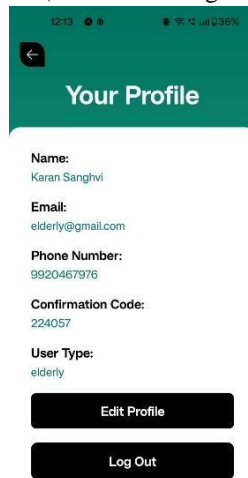


Fig 6. Profile Screen

D. Home Screen

The Home Screen of the app shows the full functionality of the app. On the home screen, we can see the different functionalities that the app provides like Profile Setup, Medical Reminders, BMI Calculator, Location Tracking, and SOS System (as shown in Figure 7).

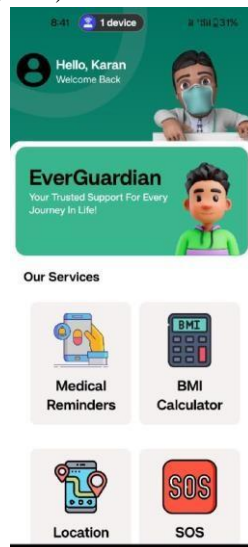


Fig 7. Home Screen

E. Medical Reminders

The Medical Reminders screen allows users to create, view, and manage medical reminders using a calendar displayed on the screen. For backend, it uses *Firebase* for data storage where the reminders are fetched and stored. The users can select a date from the calendar, view reminders for the selected date, and add new reminders through a form. This form includes fields like reminder name, notes, and time of the reminder. When the selected time is reached, the alarm will ring using the *audio modules* and *expo notifications*. These modules handle permission requests for notifications, and alarms. The users also have the ability to delete reminders and dismiss alarms which ensures a user-friendly interface for managing schedules (as shown in Figure 8).

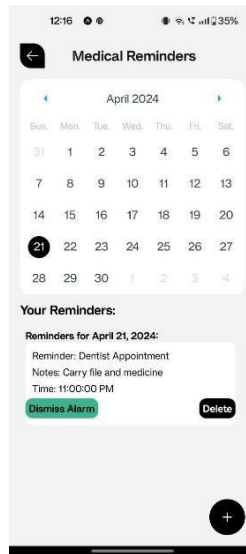


Fig 8. Medical Reminders

F. *BMI Calculator*

The Body Mass Index (BMI) calculates the user's body fat based on two parameters height and weight. The *calculateBMI* function checks if all the inputs are entered. This input includes height, weight, age, and gender. The code converts height from centimeters to meters which calculates the body mass index using the below formula:

$$\text{Distance} = \frac{\text{weight}}{\text{height} * \text{height}}$$

The above formula calculates the BMI of the person into four categories which include: Underweight, Healthy, Overweight, and Obese.

If any details are not entered by the user, an alert is seen asking the user to fill in the details to calculate the BMI. With this implementation, the program contains two pairs of increment and decrement functions which are increment and decrement of weight and age. This allows the user to enter their weight and age. The values are updated using the *setWeight* and *setAge* state.

A modal popup is seen when the BMI is calculated and it displays the result. When the BMI functionality, is integrated into the application, the calculator collects input like gender - through buttons, height - using a slider, age, and weight - with counters. Once all the details are entered by the user, the BMI is calculated and displayed showing the exact BMI and the category to which the user belongs to. (as shown in Figure 9)

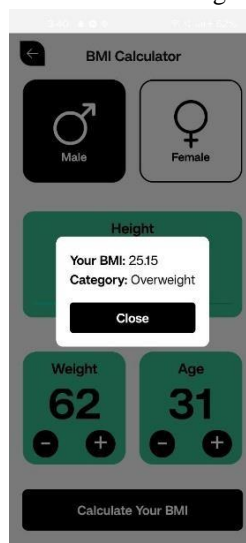


Fig 9. BMI Calculator Screen

G. *Location Tracking*

To establish location tracking implementation, the *react-google-maps-api* was used. This React library is a wrapper around the Google Maps API which is mainly designed for React applications. The library enables developers to integrate Google Maps into the app with codes like: *GoogleMap*, *Marker*, and *Polyline*. In this application, the API prompts the elderly user to ask for permission to capture their location using the device's geolocation service. The latitude and longitude coordinates are captured and are stored in *Firebase* database. This database captures and stores the elderly user's unique user ID for tracking.

The location is not only stored in the *Firebase* database but also in real-time to the guardian who is connected to the elderly user with the help of the confirmation code. On the elderly user's screen, the elderly person can see their current location which is displayed on the map by showing a red color marker indication. With this, the guardian user can see the elderly user's live location with the help of the same map interface, by showing the exact location of the elderly user with the help of the red marker integrated using Google Maps.

Some additional features which are in the app include markers, geofencing, and real-time updates. The map can also be added with features like zoom controls, terrain view, and route tracing if needed which improves the functionality of the location tracking. The overall integration gives a user-friendly way that ensures the safety of the elderly user by enabling real-time location-sharing functionality. (as shown in Figures 10 and 11)



Fig 10. Relative Location Screen



Fig 11. Guardian Location Screen

H. SOS System

The SOS system allows users to send emergency messages via SMS. It includes fields for entering name, phone number, and a custom message which is displayed on the screen once submitted. These details are then saved to

the backend database and are used to send SMS once the SOS button is clicked. The system uses the function called *SMS.sendSMSAsync* from the module which sends the message in an emergency. The module Expo SMS maximizes the device's built-in messaging functionality to send the SMS. This ensures user control and interaction for sending the message. This ensures smooth functionality for emergency communication (as shown in Figures 12 And 13).

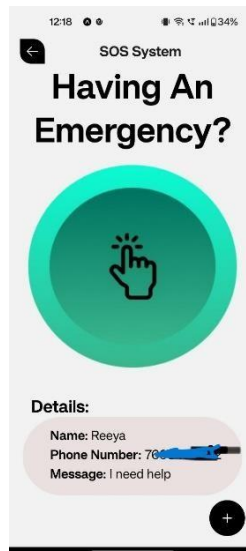


Fig 12. SOS Screen

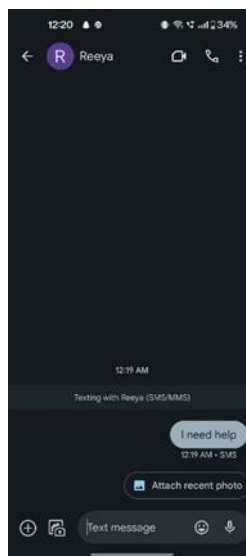


Fig 13. Message Screen

I. Fall Detection

The fall detection functionality is created to give an alert to the guardian when the elderly has fallen or whether there is any unusual activity of the elderly.

In this implementation, the React hook, *useEffect* is used to monitor the device's accelerometer. It starts and stops the listener, which calculates the total acceleration by using the components x, y and z. If the acceleration exceeds a threshold of 5 then it triggers an alert asking if the user is okay or not. If the user chooses yes, then no alert is send to the guardian but if no is chosen or there is no response in 10 seconds, then an alert is sent to the guardian, indicating there is some danger with the elderly. The accelerometer listener is cleaned up when the component unmounts (as shown in Figure 14).

Through the integration of the above screens, functionalities mentioned, the application successfully meets the proposed architecture mentioned in (Figure 1) which showcases a user-friendly experience on both Android and iOS platforms.

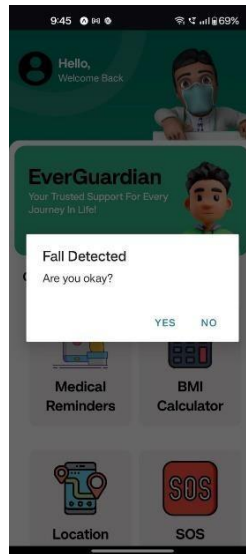


Fig 14. Fall Detection Alert

VI. CONCLUSION

The problem which we addressed earlier which are faced by the elderly population in challenges like remembering important things to unforeseen emergencies comply the need of a comprehensive user-friendly care app for our elderly. All the problems which an elderly person faces in their daily routine is addressed properly and implemented in the mobile application. This approach not only helps the elderly but also their guardian in reducing stress and having a sense of relief for their loved elderly.

While this study gives us valuable insights into the application's functionalities, future research can be explored by integrating wearable devices. This would facilitate easy monitoring of the health of the elderly person allowing the guardian to track activity levels in real time. With this, incorporating voice assistant technology would enhance the accessibility of the elderly users which enables them to interact with the application through simple voice commands. This feature would not only simplify navigation but also help those people who are not well-versed with technology. Such improvements in the application can lead to greater help for elderly users.

REFERENCES

- [1] I. Yoon et al., "SuperCaly: Smart life assistance by integrating a calendar app with location tracking, media organization and social connection," 2017 IEEE 7th Annual Computing and Communication Workshop and Conference (CCWC)
- [2] P. Kumar and R. M., "Location Based Parental Control-Child Tracking App Using Android Mobile Operating System," 2018 4th International Conference on Computing Communication and Automation (ICCCA), Greater Noida, India, 2018
- [3] J. Ding and Y. Wang, "A WiFi-Based Smart Home Fall Detection System Using Recurrent Neural Network," in IEEE Transactions on Consumer Electronics, vol. 66, no. 4, pp. 308-317, Nov. 2020
- [4] Y. Zhao and N. Medvidovic, "A Microservice Architecture for Online Mobile App Optimization," 2019 IEEE/ACM 6th International Conference on Mobile Software Engineering and Systems (MOBILESoft), Montreal, QC, Canada, 2019
- [5] A. Gupta and V. Harit, "Child Safety And Tracking Management System by Using GPS, Geo-Fencing And Android Application: An Analysis," 2016 Second International Conference on Computational Intelligence And Communication Technology (CICT), Ghaziabad, India, 2016,
- [6] P. Pavlakis, E. Alepis and M. Virvou, "Intelligent Mobile Multimedia Application for the Support of the Elderly," 2012 Eighth International Conference on Intelligent Information Hiding and Multimedia Signal Processing, Piraeus-Athens, Greece, 2012,
- [7] P. Kumar and R. M., "Location Based Parental Control-Child Tracking App Using Android Mobile Operating System," 2018 4th International Conference on Computing Communication and Automation (ICCCA), Greater Noida, India, 2018,
- [8] Adam Boduch; Roy Derks; Mikhail Sakhniuk, React and React Native: Build cross-platform JavaScript applications with native power for the web, desktop, and mobile , Packt Publishing, 2022.
- [9] nader dabit, React Native in Action: Developing iOS and Android apps with JavaScript , Manning, 2019.
keywords:
{react;react native;iOS;android;javascript},
- [10] U. A. Madaminov and M. R. Allaberganova, "Firebase Database Usage and Application Technology in Modern Mobile Applications," 2023 IEEE XVI International Scientific and Technical Conference Actual Problems of Electronic

- Instrument Engineering (APEIE), Novosibirsk, Russian Federation, 2023, pp. 1690-1694, doi: 10.1109/APEIE59731.2023.10347828.
- [11] A. H. Azizah, S. Z. Faidah, M. B. Ulum and P. Handayani, "Exploration of React Native Framework in designing a Rule- Based Application for healthy lifestyle education," 2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI), Jakarta, Indonesia, 2021, pp. 391-394, doi: 10.1109/ICCSAI53272.2021.9609763.
- [12] S. Kadrija, A. Memeti and S. Luma-Osmani, "Development of mobile app through React Native hybrid framework," 2022 11th Mediterranean Conference on Embedded Computing (MECO), Budva, Montenegro, 2022, pp. 1-6, doi: 10.1109/MECO55406.2022.9797173.
- [13] G. OuYang, "Design and Implementation of Body Mass Index Calculator Based on Android Technology," 2018 2nd IEEE Advanced Information Management, Communication, Electronic and Automation Control Conference (IMCEC), Xi'an, China, 2018, pp. 2459-2462, doi: 10.1109/IMCEC.2018.8469304.
- [14] K. NonAlinsavath et al., "Location Context Awareness System for Specific Positioning Based on Received Signal Strength for Android Platform System," 2023 9th International Conference on Engineering, Applied Sciences, and Technology (ICEAST), Vientiane, Laos, 2023, pp. 93-96, doi: 10.1109/ICEAST58324.2023.10157900.
- [15] M. Ramljak, "Smart home medication reminder system," 2017 25th International Conference on Software, Telecommunications and Computer Networks (SoftCOM), Split, Croatia, 2017, pp. 1-5, doi: 10.23919/SOFTCOM.2017.8115585.
- [16] S. Mitra, S. Punde, H. Dhote, S. Wadbudhe and G. Talmale, "Healthcare App on Medical Adherence," 2023 11th International Conference on Emerging Trends in Engineering And Technology - Signal and Information Processing (ICETET - SIP), Nagpur, India, 2023, pp. 1-6, doi: 10.1109/ICETET-SIP58143.2023.10151629.
- [17] S. K. P. V et al., "MedApp: An Application For Patient's Personal Medical History Maintenance," 2023 International Conference on Innovations in Engineering and Technology (ICIET), Muvattupuzha, India, 2023, pp. 1-6, doi: 10.1109/ICIET57285.2023.10220927.
- [18] D. Flynn and H. Kimm, "Geofencing Implement For Self-Monitoring Wandering Behavior And Sharing Location In Realtime With Firebase," 2023 IEEE Cloud Summit, Baltimore, MD, USA, 2023, pp. 84-89, doi: 10.1109/CloudSummit57601.2023.00020.